

# Oliver Sølund Kirsebom

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## Brief Bio

I hold a PhD in Nuclear Physics from Aarhus University, Denmark. For more than a decade I was a frequent visitor at particle accelerator laboratories such as CERN in Switzerland, studying the smallest building blocks of matter. Nowadays, however, my focus has shifted to a more applied realm. As the Lead Data Scientist at [Open Ocean Robotics](#), I help making sense of a wide range of ocean sensor data collected by unmanned surface vessels, building data analysis pipelines, for example, automating the detection and classification of marine mammal vocalisations.

## Employment

2024 – Present	Senior Data Scientist, Open Ocean Robotics
2022 – 2024	Lead Data Scientist, Open Ocean Robotics
2020 – 2022	Senior Staff Scientist, Dalhousie University
2018 – 2020	Lead Acoustic Data Analyst, Dalhousie University
2015 – 2018	Assistant Prof., Dept. of Physics and Astronomy, Aarhus University
2013 – 2015	Postdoc, Dept. of Physics and Astronomy, Aarhus University
2010 – 2013	Postdoc, TRIUMF, University of British Columbia

## Academic Affiliations

2025 – Present	Adjunct Prof., School of Environmental Science, Simon Fraser University
2019 – 2025	Adjunct Prof., Computer Science, Dalhousie University

## University Education

2006 – 2010	PhD Physics, Aarhus University
2005 – 2006	Fulbright student, University of Washington
2002 – 2005	BSc Physics and Mathematics, Aarhus University

## Research Grants

2022 – 2026	Canada Nature Fund for Aquatic Species at Risk, <i>Building an ‘intelligent’ whale detection and movement forecast system.</i> , €1.0M (Co-P.I.)
2020 – 2022	Ocean and Freshwater Science Contribution Program, <i>Building Neural Networks for Classification of Killer Whale Calls</i> , €0.40M (Co-P.I.)
2015 – 2018	The Villum Foundation Young Investigator Programme, <i>Nuclear Astrophysics at the Precision Frontier</i> , €0.41M (P.I.)

## Fellowships, Scholarships, and Awards

2020	Mitacs Accelerate Fellowship, <i>Identification of High-Frequency Periodic Acoustic Fish Tags With Deep learning</i> , €32k
2020	Ocean Frontier Institute Visiting Fellowship, €4k
2019	NVIDIA Accelerated Data Science GPU Grant, €2k
2010	The Villum Foundation Postdoc Fellowship, <i>Experiments in Nuclear Astrophysics With Radioactive Beams at the ISAC-II Facility at TRIUMF</i> , \$190k
2007	Foreign Graduate Student Invitation Program Grant, Tokyo Institute of Technology, Japan
2005	The Danish-American Fulbright Commission; Nordea Danmark-fonden; Faculty of Science, Aarhus University; Etatsråd CG Filtenborg og Hustru Marie Filtenborgs Studielegat; Observator mag.scient Julie Marie Vinter Hansens Rejselegat, €18k (combined)
2002	International Physics Olympiad Honorable Mention

## Publications

Over 60 peer-reviewed research articles and conference proceedings plus a smaller number of feature articles and viewpoints; 1,047 citations and  $h$ -index of 18. (Google Scholar, 2022.02.05.) A selection of recent or noteworthy papers is provided below. For a complete list, see page 4 or go to [oliskir.github.io](https://oliskir.github.io).

2023	B. Padovese, <i>et al.</i> , <i>Adapting deep learning models to new acoustic environments—A case study on the North Atlantic right whale upcall</i> , <i>Ecological Informatics</i> <b>77</b> , 102169.
2021	S. Medisetty, <i>et al.</i> , <i>Identification of periodic fish tags with deep learning</i> , <i>The Journal of Ocean Technology</i> <b>16</b> , 134–149.
2021	M. J. Rider, <i>et al.</i> , <i>Space use patterns of sharks in relation to boat activity in an urbanized coastal waterway</i> , <i>Marine Environmental Research</i> <b>172</b> , 105489.
2020	O. S. Kirsebom, <i>et al.</i> , <i>Performance of a deep neural network at detecting North Atlantic right whale upcalls</i> , <i>The Journal of the Acoustical Society of America</i> <b>147</b> , 2636–2646.
2019	O. S. Kirsebom, <i>et al.</i> , <i>Discovery of an Exceptionally Strong <math>\beta</math>-Decay Transition of <math>^{20}\text{F}</math> and Implications for the Fate of Intermediate-Mass Stars</i> , <i>Physical Review Letters</i> <b>123</b> , 262701.
2018	O. S. Kirsebom, <i>et al.</i> , <i>First Accurate Normalization of the <math>\beta</math>-delayed <math>\alpha</math> Decay of <math>^{16}\text{N}</math> and Implications for the <math>^{12}\text{C}(\alpha, \gamma)^{16}\text{O}</math> Astrophysical Reaction Rate</i> , <i>Physical Review Letters</i> <b>121</b> , 142701.
2012	O. S. Kirsebom, <i>et al.</i> , <i>Improved Limit on Direct <math>\alpha</math> Decay of the Hoyle State</i> , <i>Physical Review Letters</i> <b>108</b> , 202501.

## Talks

Numerous ( $> 50$ ) presentations at international conferences and workshops including several invited talks. For a complete list, see [oliskir.github.io](https://oliskir.github.io).

## Software

2020	<b>kadlu</b> , Underwater sound propagation modelling, Python
2019	<b>ketos</b> , Deep learning audio analysis, Python
2018	<b>simX</b> , Nuclear physics monte carlo simulation, C++
2018	<b>Open R-matrix</b> , Nuclear physics modelling, C++

## Teaching

2013 – 2017	Extracurricular programme for 1st-year students, Coordinator
2015	Nuclear astrophysics graduate course, Lecturer
2014	Electromagnetism laboratory course, Coordinator
2006 – 2010	Physics and mathematics undergraduate courses, Teaching Assistant

## Student Supervision

2020 – 2021	Santosh Medisetty, MSc Computer Science, Dalhousie University (Co-supervisor)
2019 – 2020	Xuhui Liu, MSc Computer Science, Dalhousie University (Co-supervisor)
2016 – 2017	Helle Bisgaard Sørensen, MSc Physics, Aarhus University (Principal supervisor)
2014 – 2015	Sofie Tilbæk Nielsen, BSc Physics, Aarhus University (Principal supervisor)

## Conference and Workshop Organization

21–22 Nov 2019	Organizer of the workshop <i>Detection and Classification in Marine Bioacoustics with Deep Learning</i> with 30 participants from Canada, the U.S. and Europe.
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## Academic Services

2022 – Present	Member of ONC's <b>Ocean Observatory Council</b>
2016 – 2018	Member of the Liaison Committee at the Department of Physics and Astronomy, Aarhus University

## Refereeing

Physics Review Letters, Physical Review C, The Astrophysical Journal, Journal of the Acoustical Society of America, Hyperfine Interactions, Methods in Ecology and Evolution, PLOS One

## Professional Memberships

2018 – 2020	Member of the Canadian Acoustical Association
2013 – 2018	Member of the Danish Physical Society

## Languages

Danish (mother tongue), English (fluent), German (intermediate), Italian (intermediate)

# Publications

## Research Articles

- K. J. Palmer, E. Cummings, M. G. Dowd, K. Frasier, F. Frazao, A. Harris, A. Houweling, J. Kanés, O. S. Kirsebom, H. Klinck, H. LeBlond, L. Laturnus, C. Matkin, O. Murphy, H. Myers, D. Olsen, C. O'Neill, B. Padovese, J. Pilkington, L. Quayle, A. R. Vuibert, K. Trounce, S. Vagle, S. Veirs, V. Veirs, J. Wladichuk, J. Wood, T. Yack, H. Yurk, and R. Joy. *A Public Dataset of Annotated Orcinus orca Acoustic Signals for Detection and Ecotype Classification*. Scientific Data **12**, 1137. ISSN 2052-4463 (2025), URL <http://dx.doi.org/10.1038/s41597-025-05281-5>
- E. Jensen, S. Nielsen, A. Andreyev, M. Borge, J. Cederkl, L. Fraile, H. Fynbo, L. Harkness-Brennan, B. Jonson, D. Judson, O. Kirsebom, R. Lic, M. Lund, M. Madurga, N. Marginean, C. Mihai, R. Page, A. Perea, K. Riisager, and O. Tengblad. *Detailed study of the decay of  $^{21}\text{Mg}$* . The European Physical Journal A **60**, 153 (2024), URL <http://dx.doi.org/https://doi.org/10.1140/epja/s10050-024-01376-6>
- B. Padovese, O. S. Kirsebom, F. Frazao, C. H. Evers, W. A. Beslin, J. Theriault, and S. Matwin. *Adapting deep learning models to new acoustic environments - A case study on the North Atlantic right whale upcall*. Ecological Informatics **77**, 102169. ISSN 1574-9541 (2023), URL <http://dx.doi.org/https://doi.org/10.1016/j.ecoinf.2023.102169>
- L. Sun, C. Fry, B. Davids, N. Esker, C. Wrede, M. Alcorta, S. Bhattacharjee, M. Bowry, B. A. Brown, T. Budner, R. Caballero-Folch, L. Evitts, M. Friedman, A. Garnsworthy, B. Glassman, G. Hackman, J. Henderson, O. S. Kirsebom, J. Lighthall, P. Machule, J. Measures, M. Moukaddam, J. Park, C. Pearson, D. Prez-Loureiro, C. Ruiz, P. Ruotsalainen, J. Smallcombe, J. K. Smith, D. Southall, J. Surbrook, L. E. Weghorn, and M. Williams. *First application of Markov chain Monte Carlo-based Bayesian data analysis to the Doppler-shift attenuation method*. Physics Letters B **839**, 137801. ISSN 0370-2693 (2023), URL <http://dx.doi.org/https://doi.org/10.1016/j.physletb.2023.137801>
- M. Kuhlwein, K. Lytje, H. O. U. Fynbo, A. Gad, E. Jensen, O. S. Kirsebom, M. Munch, J. Refsgaard, and K. Riisager. *Exclusive decay study of the  $16.62\text{ MeV}$  ( $2^-$ ,  $T = 1$ ) resonance in  $^{12}\text{C}$* . Physics Letters B **825**, 136857. ISSN 0370-2693 (2022), URL <http://dx.doi.org/https://doi.org/10.1016/j.physletb.2021.136857>
- S. Medisetty, D. Ouellette, F. Smith, M. Richard, S. Johnston, J. Quirion, J. Newport, C. Whidden, and O. Kirsebom. *Identification of periodic fish tags with deep learning*. The Journal of Ocean Technology **16**, 134–149 (2021)
- M. J. Rider, O. S. Kirsebom, A. J. Gallagher, E. Staaterman, J. S. Ault, C. R. Sasso, T. Jackson, J. A. Browder, and N. Hammerschlag. *Space use patterns of sharks in relation to boat activity in an urbanized coastal waterway*. Marine Environmental Research page 105489. ISSN 0141-1136 (2021), URL <http://dx.doi.org/https://doi.org/10.1016/j.marenvres.2021.105489>
- N. J. Hubbard, C. A. Diget, S. P. Fox, H. O. U. Fynbo, A. M. Howard, O. S. Kirsebom, A. M. Laird, M. Munch, A. Parikh, M. Pignatari, and J. R. Tomlinson. *New Experimental  $^{23}\text{Na}(,p)^{26}\text{Mg}$  Reaction Rate for Massive Star and Type Ia Supernova Models*. The Astrophysical Journal **912**, 59 (2021), URL <http://dx.doi.org/10.3847/1538-4357/abee91>
- B. Padovese, F. Frazao, O. S. Kirsebom, and S. Matwin. *Data augmentation for the classification of North Atlantic right whales upcalls*. The Journal of the Acoustical Society of America **149**, 2520–2530 (2021), URL <http://dx.doi.org/10.1121/10.0004258>

- O. S. Kirsebom, A. M. Howard, M. Munch, S. Sablok, J. A. Swartz, and H. O. U. Fynbo. *Experimental study of the  $^{11}\text{B}(p, 3\alpha)\gamma$  reaction at  $E_p = 0.5\text{--}2.7\text{ MeV}$* . The European Physical Journal A **56**, 179 (2020), URL <http://dx.doi.org/10.1140/epja/s10050-020-00183-z>
- O. S. Kirsebom, F. Frazao, Y. Simard, N. Roy, S. Matwin, and S. Giard. *Performance of a deep neural network at detecting North Atlantic right whale upcalls*. The Journal of the Acoustical Society of America **147**, 2636–2646 (2020), URL <http://dx.doi.org/10.1121/10.0001132>
- M. Munch, O. S. Kirsebom, J. A. Swartz, and H. O. U. Fynbo. *Resolving the  $^{11}\text{B}(p, \alpha_0)$  cross-section discrepancies between 0.5 and 3.5 MeV*. The European Physical Journal A **56**, 17 (2020), URL <http://dx.doi.org/10.1140/epja/s10050-019-00016-8>
- O. S. Kirsebom, S. Jones, D. F. Strömberg, G. Martínez-Pinedo, K. Langanke, F. K. Röpke, B. A. Brown, T. Eronen, H. O. U. Fynbo, M. Hukkanen, A. Idini, A. Jokinen, A. Kankainen, J. Kostensalo, I. Moore, H. Möller, S. T. Ohlmann, H. Penttilä, K. Riisager, S. Rinta-Antila, P. C. Srivastava, J. Suhonen, W. H. Trzaska, and J. Äystö. *Discovery of an Exceptionally Strong  $\beta$ -Decay Transition of  $^{20}\text{F}$  and Implications for the Fate of Intermediate-Mass Stars*. Phys. Rev. Lett. **123**, 262701 (2019), URL <http://dx.doi.org/10.1103/PhysRevLett.123.262701>
- O. S. Kirsebom, M. Hukkanen, A. Kankainen, W. H. Trzaska, D. F. Strömberg, G. Martínez-Pinedo, K. Andersen, E. Bodewits, B. A. Brown, L. Canete, J. Cederkäll, T. Enqvist, T. Eronen, H. O. U. Fynbo, S. Geldhof, R. de Groote, D. G. Jenkins, A. Jokinen, P. Joshi, A. Khanam, J. Kostensalo, P. Kuusiniemi, K. Langanke, I. Moore, M. Munch, D. A. Nesterenko, J. D. Ovejas, H. Penttilä, I. Pohjalainen, M. Reponen, S. Rinta-Antila, K. Riisager, A. de Roubin, P. Schotanus, P. C. Srivastava, J. Suhonen, J. A. Swartz, O. Tengblad, M. Vilen, S. Vinals, and J. Äystö. *Measurement of the  $2^+ \rightarrow 0^+$  ground-state transition in the  $\beta$  decay of  $^{20}\text{F}$* . Phys. Rev. C **100**, 065805 (2019), URL <http://dx.doi.org/10.1103/PhysRevC.100.065805>
- B. Davids, M. Williams, N. E. Esker, M. Alcorta, D. Connolly, B. R. Fulton, K. Hudson, N. Khan, O. S. Kirsebom, J. Lighthall, and P. Machule. *Initial operation of the recoil mass spectrometer EMMA at the ISAC-II facility of TRIUMF*. Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment **930**, 191–195 (2019), URL <http://dx.doi.org/https://doi.org/10.1016/j.nima.2019.03.070>
- O. S. Kirsebom, O. Tengblad, R. Lica, M. Munch, K. Riisager, H. O. U. Fynbo, M. J. G. Borge, M. Madurga, I. Marroquin, A. N. Andreyev, T. A. Berry, E. R. Christensen, P. D. Fernández, D. T. Doherty, P. Van Duppen, L. M. Fraile, M. C. Gallardo, P. T. Greenlees, L. J. Harkness-Brennan, N. Hubbard, M. Huyse, J. H. Jensen, H. Johansson, B. Jonson, D. S. Judson, J. Konki, I. Lazarus, M. V. Lund, N. Marginean, R. Marginean, A. Perea, C. Mihai, A. Negret, R. D. Page, V. Pucknell, P. Rahkila, O. Sorlin, C. Sotty, J. A. Swartz, H. B. Sørensen, H. Törnqvist, V. Vedia, N. Warr, and H. De Witte. *First Accurate Normalization of the  $\beta$ -delayed  $\alpha$  Decay of  $^{16}\text{N}$  and Implications for the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  Astrophysical Reaction Rate*. Physical Review Letters **121**, 142701 (2018), URL <http://dx.doi.org/10.1103/PhysRevLett.121.142701>
- M. Dahl, A. Brun, O. S. Kirsebom, and G. Andresen. *Improving Short-Term Heat Load Forecasts with Calendar and Holiday Data*. Energies **11**, 1678 (2018), URL <http://dx.doi.org/10.3390/en11071678>
- M. Munch, O. S. Kirsebom, J. A. Swartz, K. Riisager, and H. O. U. Fynbo. *Measurement of the full excitation spectrum of the  $^7\text{Li}(p, \gamma)\alpha\alpha$  reaction at 441 keV*. Physics Letters B **782**, 779–784 (2018), URL <http://dx.doi.org/10.1016/j.physletb.2018.06.013>

- J. Refsgaard, H. O. U. Fynbo, O. S. Kirsebom, and K. Riisager. *Three-body effects in the Hoyle-state decay*. Physics Letters B **779**, 414–419 (2018), URL <http://dx.doi.org/10.1016/j.physletb.2018.02.031>
- V. Pesudo, M. J. G. Borge, A. M. Moro, J. A. Lay, E. Nácher, J. Gómez-Camacho, O. Tengblad, L. Acosta, M. Alcorta, M. A. G. Alvarez, C. Andreoiu, P. C. Bender, R. Braid, M. Cubero, A. D. Pietro, J. P. Fernández-García, P. Figuera, M. Fisichella, B. R. Fulton, A. B. Garnsworthy, G. Hackman, U. Hager, O. S. Kirsebom, K. Kuhn, M. Lattuada, G. Marquínez-Durán, I. Martel, D. Miller, M. Moukaddam, P. D. O’Malley, A. Perea, M. M. Rajabali, A. M. Sánchez-Benítez, F. Sarazin, V. Scuderi, C. E. Svensson, C. Unsworth, and Z. M. Wang. *Scattering of the Halo Nucleus  $^{11}\text{Be}$  on  $^{197}\text{Au}$  at Energies around the Coulomb Barrier*. Physical Review Letters **118**, 152502 (2017), URL <http://dx.doi.org/10.1103/physrevlett.118.152502>
- M. V. Lund, A. Andreyev, M. J. G. Borge, J. Cederkll, H. D. Witte, L. M. Fraile, H. O. U. Fynbo, P. T. Greenlees, L. J. Harkness-Brennan, A. M. Howard, M. Huyse, B. Jonson, D. S. Judson, O. S. Kirsebom, J. Konki, J. Kurcewicz, I. Lazarus, R. Lica, S. Lindberg, M. Madurga, N. Marginean, R. Marginean, I. Marroquin, C. Mihai, M. Munch, E. Nacher, A. Negret, T. Nilsson, R. D. Page, S. Pascu, A. Perea, V. Pucknell, P. Rahkila, E. Rapisarda, K. Riisager, F. Rotaru, C. Sotty, M. Stanoiu, O. Tengblad, A. Turturica, P. V. Duppen, V. Vedia, R. Wadsworth, and N. Warr. *Beta-delayed proton emission from  $^{20}\text{Mg}$* . The European Physical Journal A **52**, 304 (2016), URL <http://dx.doi.org/10.1140/epja/i2016-16304-x>
- K. L. Laursen, H. O. U. Fynbo, O. S. Kirsebom, K. S. Madsbøll, and K. Riisager. *Complete kinematical study of the  $3\alpha$  breakup of the 16.11 MeV state in  $^{12}\text{C}$* . The European Physical Journal A **52**, 271 (2016), URL <http://dx.doi.org/10.1140/epja/i2016-16271-2>
- M. Munch, M. Alcorta, H. O. U. Fynbo, M. Albers, S. Almaraz-Calderon, M. L. Avila, A. D. Ayangeakaa, B. B. Back, P. F. Bertone, P. F. F. Carnelli, M. P. Carpenter, C. J. Chiara, J. A. Clark, B. DiGiovine, J. P. Greene, J. L. Harker, C. R. Hoffman, N. J. Hubbard, C. L. Jiang, O. S. Kirsebom, T. Lauritsen, K. L. Laursen, S. T. Marley, C. Nair, O. Nusair, D. Santiago-Gonzalez, J. Sethi, D. Seweryniak, R. Talwar, C. Ugalde, and S. Zhu. *Independent measurement of the Hoyle state  $\beta$  feeding from  $^{12}\text{B}$  using Gammasphere*. Physical Review C **93**, 065803 (2016), URL <http://dx.doi.org/10.1103/physrevc.93.065803>
- O. S. Kirsebom, P. Bender, A. Cheeseman, G. Christian, R. Churchman, D. S. Cross, B. Davids, L. J. Evitts, J. Fallis, N. Galinski, A. B. Garnsworthy, G. Hackman, J. Lighthall, S. Ketelhut, P. Machule, D. Miller, S. T. Nielsen, C. R. Nobs, C. J. Pearson, M. M. Rajabali, A. J. Radich, A. Rojas, C. Ruiz, A. Sanetullaev, C. D. Unsworth, and C. Wrede. *Measurement of lifetimes in  $^{23}\text{Mg}$* . Physical Review C **93**, 025802 (2016), URL <http://dx.doi.org/10.1103/physrevc.93.025802>
- J. Refsgaard, O. Kirsebom, E. Dijck, H. Fynbo, M. Lund, M. Portela, R. Raabe, G. Randisi, F. Renzi, S. Sambi, A. Sytema, L. Willmann, and H. Wilschut. *Measurement of the branching ratio for  $\beta$ -delayed  $\alpha$  decay of  $^{16}\text{N}$* . Physics Letters B **752**, 296–301 (2016), URL <http://dx.doi.org/10.1016/j.physletb.2015.11.047>
- K. L. Laursen, H. O. U. Fynbo, O. S. Kirsebom, K. S. Madsbøll, and K. Riisager. *Unbound states in  $^{12}\text{C}$  populated by  $\gamma$ -decay of the  $(J^\pi, T) = (2^+, 1)$  16.11 MeV state*. The European Physical Journal A **52**, 370 (2016), URL <http://dx.doi.org/10.1140/epja/i2016-16370-0>
- V. Margerin, G. Lotay, P. J. Woods, M. Aliotta, G. Christian, B. Davids, T. Davinson, D. T. Doherty, J. Fallis, D. Howell, O. S. Kirsebom, D. J. Mountford, A. Rojas, C. Ruiz, and J. A. Tostevin. *Inverse Kinematic Study of the  $^{26}\text{gAl}(d, p)\text{Al}^{27}$  Reaction and Implications for Destruction of  $^{26}\text{Al}$  in Wolf-Rayet and Asymptotic Giant Branch Stars*. Physical Review



Letters **115**, 062701 (2015), URL <http://dx.doi.org/10.1103/physrevlett.115.062701>

- A. M. Howard, M. Munch, H. O. U. Fynbo, O. S. Kirsebom, K. L. Laursen, C. A. Diget, and N. J. Hubbard.  $^{23}\text{Na}(\alpha, p)^{26}\text{Mg}$  Reaction Rate at Astrophysically Relevant Energies. Physical Review Letters **115**, 052701 (2015), URL <http://dx.doi.org/10.1103/physrevlett.115.052701>
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- M. J. G. Borge, L. M. Fraile, H. O. U. Fynbo, B. Jonson, O. S. Kirsebom, T. Nilsson, G. Nyman, G. Possnert, K. Riisager, and O. Tengblad. Rare  $\beta p$  decays in light nuclei. Journal of Physics G: Nuclear and Particle Physics **40**, 035109 (2013), URL <http://dx.doi.org/10.1088/0954-3899/40/3/035109>
- O. S. Kirsebom, M. Alcorta, M. J. G. Borge, M. Cubero, H. O. U. Fynbo, M. Madurga, and O. Tengblad. Observation of  $\alpha$  decay from a state in  $^{10}\text{B}$  at 11.48 MeV. Physical Review C **85**, 054308 (2012), URL <http://dx.doi.org/10.1103/physrevc.85.054308>
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